Measuring achievement goals: A methodological contribution based on mouse-tracking data

Alisée Bruno, Annique Smeding, Jean-Charles Quinton, Benoit Dompnier, Céline Darnon

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Bruno.A[1], Smeding.A[2], Quinton. J-C[3], Dompnier. B[4], Darnon. C[1]

Université Clermont Auvergne[1]
Université Savoie Mont Blanc[2]
Université Grenoble Alpes[3]
Université de Lausanne[4]

Introduction

Developing and sustaining students' motivation to learn represents an essential educational challenge for teachers, parents, and policy-makers alike, because this motivation should foster learning and achievement. [1]

Although it has been assumed that the motivation to learn – or mastery (approach) goal endorsement – and to perform better than others – or performance (approach) goal endorsement - predicts learning and achievement, findings are still inconsistent in the literature. One explanation may be related to response biases, and more specifically *social desirability bias*.

The aim of this research was to develop an implicit measure of mastery and performance goals by recording computer mouse movements. Mouse-tracking allows measuring participants' hand movements, which reflect underlying cognitive processes, including neural competition involved in decision making dynamics. [2]

In this study, Area Under the Curve (AUC) was used to measure implicit achievement goals. Convergent validity between the implicit measure and achievement goals' explicit, self-reported equivalent measures was tested.

Method studies 1 & 2

Participants. Study 1 : 142 psychology students (*Mage* = 20.3, *SD* = 3.4) Study 2 : 133 psychology students (*Mage* = 20.9, *SD* = 2.78)
1) Pre-test: 10 words for performance goals (***COMPETITION***) and 10 for mastery goals (***COMPREHENSION***), χ^2 ($p < .05$).
2) Implicit measure (Imp).

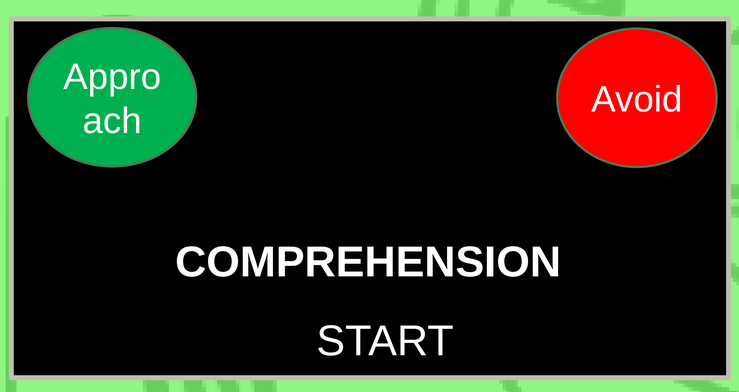
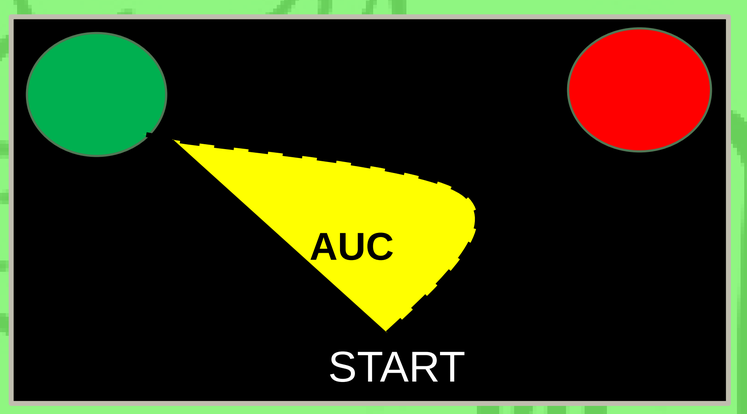


Figure 1. Sample item

Figure 2. Sample illustration of the AUC



3) Self report measure (Exp). 2x2 scale of achievement goals Elliot & Murayama (2008)

My goal is to learn as much as possible in my studies.	□ 1	□ 2	□ 3	□ 4	□ 5	□ 6	□ 7

Results

Variables	Mastery-Implicit	Mastery-Explicit	Performance-Explicit	Performance-Implicit	AUC_Performance	AUC_Mastery
Mastery_Implicit	**-**	.14	.08	.05	.15	**-.26****
Mastery_Explicit	**.22***	**-**	.13	.09	.01	-.11
Performance_Explicit	.03	.26*	**-**	**.50***	**-.36****	-.23*
Performance_Implicit	.17	.17	**.54****	**-**	**-.42****	-.44**
AUC_Performance	.03	-.08	**-.19***	**-.38****	**-**	.34**
AUC_Mastery	**-.24***	**-.24***	.04	-.13	.50	**-**

Table 1. Values above the diagonal refer to the Study 1 / values below the diagonal refer to Study 2. * indicate significant correlations. p <.05 *. p <. 001 **.

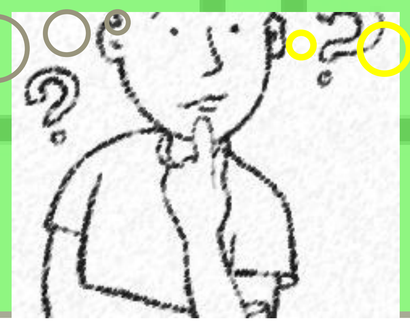
Discussion

Implicit measure (AUC)

Measures partially converge

Self report measure

Implicit indicators appear to partially converge with explicit measure but not systematically in the 2 studies for each goal



MT-based indicators are promising for achievement-goal research, but more empirical work is needed to consolidate current findings

[1] Hulleman, C., Bodmann. S., Schrager, M., Harackiewicz, J. (2010). A Meta-Analytic Review of Achievement Goal Measures: Different Labels for the Same Constructs or Different Constructs With Similar Labels? Psychological Bulletin, 136, 3, 422–449.

[2] Freeman, J. B. & Ambady, N. (2010). MouseTracker : software for studying real-time mental processing using a computer mouse-tracking method, Behavior research methods, 42 (1), 226-241.
[3] Elliot, A. J., Murayama, K., & Pekrun, R. (2011). A 3 × 2 achievement goal model. Journal of Educational Psychology, 103(3), 632–648.